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ENHANCEMENT OF HYDROCLIMATIC IMPACTS ON PERMAFROST ENVIRONMENT IN EASTERN SIBERIA

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In the last decade, unusual increases in soil temperature and thaw depth (active layer thickness) have taken place in the central Lena River basin where is the center of the continuous permafrost region in the Eurasian Continent. The peculiar feature of the warming is that the soil moisture correspondingly increases within the active layer observed at many in-situ observation sites in this region. This hydrothermal change was primarily due to wet climate conditions rather than atmospheric warming with abnormally large amounts of winter snow accumulation and rainfall in late summer in the central and southern part of the Lena River basin. The wet conditions in eastern Siberia were in conjunction with enhancement of cyclonic anomaly over the Arctic Ocean and eastward propagation of storm activities as dominant pressure pattern from late 1990s to 2000s. Water vapor flux from both westerly and Pacific side was converged and manifested precipitation over the eastern Siberia. As results, consecutive positive anomalies of winter snow accumulation and rainfall in subsequent summer which had seldom occurred in the last century effectively humidified land surface on the permafrost region after 2005 resulting abrupt soil warming and wetting in active layer and upper part of permafrost. According to the long-term relationship between snow/rainfall and soil temperature, not only continuous positive impacts of snow on soil warming, but rainfall in summer became significant additional accelerator of soil warming. It means that hydroclimatic impact increases in its importance on changing permafrost environments in this region.